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Short communication

Attitudes towards epilepsy surgery: A nationwide survey among Swedish neurologists

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ABSTRACT

Purpose: Epilepsy surgery is safe and effective for epilepsy that is refractory to medical treatment. However, only a minority of candidates for epilepsy surgery are referred for surgical evaluation. We investigated Swedish neurologists' views on and criteria for referral for epilepsy surgery.
Materials and methods: A survey was sent out to neurologists who treat patients with epilepsy. We received responses from 81% of referring hospitals and 57% of private practices.
Results: Sixty-one percent of respondents considered that epilepsy surgery reduced seizure frequency and 53% that it improved quality of life. Surgical treatment was thought to be cost-effective by 90% of respondents. Referral for surgery was considered if three or more antiepileptic drugs had failed. Seizure frequency and severity and, the patient's own wishes were regarded as the most important criteria for surgical referral. MRI and EEG findings were also important whereas duration of illness was considered less important. Age below 65 years and lack of mental retardation were important for considering referral.
Conclusion: In general Swedish neurologists have a cautious but positive attitude towards epilepsy surgery. Uncertainties about eligibility criteria among referring clinicians may contribute to the underutilization of epilepsy surgery.

1. Introduction

Surgical treatment is effective and safe for epilepsy that is refractory to medical treatment.[1–3] However, the use of surgical procedures seems to be low and referral of patients to epilepsy centres occurs late in the course of the disease.[4–6] One reason underlying this situation may be uncertainty about candidate selection.

The exact proportion of drug-resistant patients who should be offered surgical treatment is unknown. Estimates in the literature vary from 1.5% of newly diagnosed patients each year to 12.5–25% of all patients with refractory epilepsy.[6,7]

In the present study, we investigated the number of patients with epilepsy who were treated by surgery in Sweden. We also investigated Swedish neurologists' views on epilepsy surgery, by focusing on questions about their own experience and opinions about eligibility for inclusion.

2. Methods

2.1. Data collection

Data were collected from the Swedish National Epilepsy Surgery Register on the number of operations and duration of epilepsy before referral, between 1991 and 2007.

2.2. Neurologists

A survey was distributed to neurology and internal medicine clinics in 69 hospitals and to 14 private practices. The hospitals were identified through an official medical register and private neurologists through the telephone directory. Specialists in neurology were asked to participate in the study. In Sweden, 289 neurologists work in health care (Swedish National Board on Health and Welfare 2006). Around 150 neurologists, who work in university hospitals with epilepsy surgery facilities, were not invited to participate.

2.3. Survey design

The survey consisted of three parts: (1) demographic data were collected; (2) respondents were asked about their experience of

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epilepsy surgery; and (3) respondents were asked to grade eligibility criteria for referral to pre-surgical evaluation.

2.4. Statistical analysis

The magnitude of the decline in the annual number of patients undergoing epilepsy surgery in Sweden was estimated using linear regression analysis. Fischer's exact test was used to estimate differences in attitudes between neurologists with and without experience of epilepsy surgery.

3. Results

The number of operations declined from 78 in 1991 to less than 50 in a population of 9 million inhabitants in 2007 which means a reduction of 2.5 (SE 0.5) patient per year ($p < 0.0001$). The yearly number of epilepsy surgery procedures in Sweden is now less than 0.55 per 100 000 inhabitants. The mean duration of epilepsy before surgery was 15.3 (SD 11.4) years.

In total, 100 responses were received, 92 from neurologists working in 56 different hospitals and 8 from neurologists in private practice. The individual response rate was 66% with a higher response rate from hospital (81%) than from private practices (57%). Five responses were incomplete, which accounted for the variations in the total number of responses. All respondents treated epilepsy patients regularly. Thirty-six percent of the respondents had referred 2–5 patients for epilepsy surgery and 32% had referred 6 or more patients. Thirty-two percent had never referred any patients. We tested if the attitudes of physicians with experience of referrals for epilepsy surgery ($n = 66$) differed from those with no experience ($n = 32$) using Fischer's exact test. For these analyses, attitudes on cost-effectiveness were divided into two categories, low vs. high, and requirements for number of tried AEDs were divided into 1–2 vs. 3 or more. All variables in Table 2 were dichotomised into very important and important vs. less important and not important. There were no statistically significant differences ($p = 0.05$ in all analyses).

The effect of surgery on seizure frequency was considered to be good or very good by 61% of the respondents and 53% evaluated the effect on quality of life to be good or very good. Ninety-two percent of the neurologists considered cost-effectiveness of epilepsy surgery to be high or very high. Neurological complications, minor as well as and major, were experienced by 41% of neurologists. The number of antiepileptic drugs (AEDs) tried before surgical referral varied from two upwards (see Table 1).

The most important criteria for candidate selection were seizure frequency (68%) and the patient's own wish (62%). The existences of lesions on MRI were very important to 45% of respondents and epileptiform activity seen on EEG to 40%. Duration of epilepsy was considered as less important to 65.3% of respondents. Age <65 years was very important, 22%, or important to 57% of respondents. Lack of mental retardation was very important to 11% and important to 45% (Table 2).

Table 1
Responses to question about neurologists' experience of epilepsy surgery.

How do you evaluate the effect of epilepsy surgery on seizure frequency? ($n = 98$)	
	n%
Very good	14 (14.3)
Good	46 (46.9)
Not good	0 (0.0)
No experience	38 (38.8)
How do you evaluate the effect of epilepsy surgery on quality of life? ($n = 98$)	
	n%
Very good	13 (13.1)
Good	39 (39.4)
Not good	2 (2.0)
No experience	45 (45.5)
How often have you experienced neurological complications after epilepsy surgery? ($n = 98$)	
	n%
Often	1 (1.0)
Sometimes	5 (5.0)
Seldom	33 (33.7)
Never	16 (16.3)
No experience	43 (43.9)
How do you evaluate the cost-effectiveness of epilepsy surgery? ($n = 91$)	
	n%
Very high	26 (26.6)
High	56 (61.6)
Rather low	8 (8.8)
Low	1 (1.0)
How many AEDs should have been tried before considering epilepsy surgery? $n = 95$	
	n%
Four or more	23 (24.2)
Three	55 (57.9)
Two	17 (17.9)
One	0 (0.0)

4. Discussion

The annual number of operations for epilepsy in Sweden has declined between 1991 and 2007 at a rate of 2.5 per year and is now less than 50 patients per year. The reason for this is unknown. The present study investigated whether negative attitudes among Swedish neurologists could have an impact on referral for epilepsy surgery. Sixty-five percent of the responding neurologists had experience of epilepsy surgery and 32% stated that they had little or no experience. There was no statistical difference between attitudes among neurologists who had experience from own referral in comparison with those who had never referred any patient. However, the response pattern suggests that Swedish neurologists who treat epilepsy patients are divided into two groups: one referring and the other not referring for epilepsy surgery evaluation. The responses from the neurologists suggest that they have a generally positive expectation of the outcome of surgical treatment. Concerns about costs do not seem to hinder

Table 2
Survey responses: evaluation of criteria for eligibility for epilepsy surgery assessment.

Criteria	Very important *n*%	Important *n*%	Less important *n*%	Not important *n*%
High seizure frequency (>1/month)	66 (68.1)	29 (29.9)	1 (1.0)	1 (1.0)
Patient's own wish	59 (61.5)	32 (33.3)	4 (4.2)	1 (1.0)
Lesion on MRI	44 (45.4)	38 (39.2)	11 (11.3)	4 (4.1)
Epileptiform activity on EEG	39 (39.8)	38 (38.8)	16 (16.3)	5 (5.1)
Duration of illness (>5 years)	6 (6.3)	22 (23.1)	62 (65.3)	5 (5.3)
Age <65 years	21 (22.2)	54 (56.8)	20 (21.0)	0 (0.0)
Absence of mental retardation	11 (11.3)	44 (45.4)	37 (38.1)	5 (5.2)

referrals because 92% of the respondents considered surgery to be effective from a cost-benefit point of view.

The timing of epilepsy surgery has been much debated and is related to drug-resistance and duration of epilepsy. Evidence from the literature suggests that when a patient has tried three AEDs the likelihood of becoming seizure-free decreases. The majority of the respondents considered that three AEDs would be appropriate before investigation for epilepsy surgery. They also did not consider long duration of illness to be a prerequisite for surgery. However, the patients who are eventually operated on are referred after an average of 15 years according to the Swedish register. Similar figures have been reported from other countries.[5,6] In adult practice, most surgical procedures are carried out in individuals aged <40 years. Good results, however, have been reported for individuals in their mid-60s or older.[8] The majority of the respondents did not consider age to be an exclusion criterion. Low IQ has for a long time been considered as a contraindication for epilepsy surgery. In our study, a small majority regarded mental retardation to be an exclusion criterion. However, many patients with low IQ benefits from epilepsy surgery.[9]

The results of the present study are in line with previous findings on neurologists' views on epilepsy surgery which have been investigated recently in Michigan, USA.[10] Neurologists in both countries find epilepsy surgery effective in terms of achieving seizure freedom and improved quality of life. Furthermore, the patient's own request seems to be an important factor in the decision to refer patients for epilepsy surgery. There were also differences. In contrast to Michigan, most Swedish neurologists place an emphasis on the existence of lesions identified by MRI and pathological EEG. The two studies differed methodogically in several ways. In our study Swedish neurologists were asked about their experience with epilepsy surgery, not their knowledge of published epilepsy surgery outcomes. The most obvious difference, however, was the study context. Our study was nationwide and the American study was restricted to a smaller area. We believe that the results from our study can be generalised because of the high responder rate (81%) and coverage of the entire country.

A potential limitation of our study is that the survey used was not reviewed for validation prior to data collection. Furthermore, only neurologists' views about adults were sought. Neuropediatricians may be keener to refer their patients for epilepsy surgery.

To conclude, Swedish neurologists, in general, have a positive attitude towards epilepsy surgery. Uncertainties about eligibility criteria may contribute to underutilization of surgery. Criteria for referral should be elaborated in collaboration between care providers of different levels i.e. general neurologists and epileptologists to improve referral rates.

Conflict of interests

None.

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